SECTION 3100--SANITARY SEWER MANHOLES

3101 SCOPE. This section covers standard, drop, and special sewer manholes. Manholes shall be constructed complete with covers, steps, fittings, and other appurtenances, in accordance with the details indicated on the drawings.

At the option of the contractor, standard and drop manholes shall be constructed of precast concrete sections or cast-in-place concrete.

Only manholes which are required to have outside pipe and fittings for dropping sewage into the lower line will be designated as drop manholes. Inside drop manholes where the incoming line discharges directly into the manhole and which do not require special fittings will be considered standard manholes.

Manholes shall be placed in locations that will not be in conflict with future sidewalk or driveway construction.

3102 MATERIALS.

Concrete	Materials, handling, forms, finishing, curing, and other work as specified in Section 2000 *Concrete.*
Precast Sections	Circular precast concrete; ASTM C478, except as modified. Joints shall be of a bitumastic material or preformed flexible joint sealant applied in accordance with manufacturer's recommendation. A-Lok pipe to manhole connectors or approved equal are required for all manhole connections up to a pipe diameter of 36”.
Minimum Thickness	As indicated on the drawings.
Reinforcement	As indicated on the drawings.
Openings	Circular or horseshoe-shaped box-out for each connecting pipe, with surfaces grooved or roughened to improve mortar bond Where manholes are constructed over existing lines, water stop gaskets shall be required.
Portland Cement	ASTM C150
Sand	Concrete sand (fine aggregate) sieved through 8 mesh screen
Shrinkage-Correcting Aggregate	Master Builders "Embeco", Sika "Kemox", or Sonneborn "Ferrolith G-DS".
Mortar	One part portland cement Type II, 3 parts sand, 1/4 part hydrated lime, ASTM C-207.
Non-Shrinking Mortar	Premixed or job mixed; job mixed shall be one part shrinkage-correcting aggregate, one part portland cement, one part sand.
Flat Wrap	Approved material: EZ Wrap, Rubber (Press-Seal Gasket Corp.) or equal.
Gaskets	
Mastic	Hamilton-Kent "Kent-Seal No. 2" (minimum two-1" or one-2" beads per joint), or approved equal. Enough material shall be applied to fill the joint so that a minimum of 1/4-inch bead is visible, to be smoothed off after completion.
Flexible Joint	Preformed "0" ring; butylrubber or bituminous polymer are

	acceptable. Natural rubber is not acceptable
Coal Tar Paint	Koppers "Bitumastic Super-Service Black," Porter "Tarmastic 103," Tnemec "450 Heavy Tnemecol," or approved equal
Castings	ASTM A48, with asphalt varnish coating applied at the foundry

3103 STANDARD MANHOLES. All manholes shall be constructed, complete with covers and ladder steps, in accordance with the details shown on the drawings and found herein. Standard manholes above the foundations, unless otherwise required by the plans, shall be constructed of poured-in-place concrete or solid, precast, curved segmental concrete masonry units of circular sections specially cast for use in manhole construction. Manholes shall be constructed with eccentric cones unless otherwise approved by the city engineer.

Foundations for all standard manholes shall have a minimum 28-day compressive strength of 3000 psi.

Precast concrete sections shall be inspected when delivered and all cracked or otherwise visibly defective units rejected.

Prior to backfilling, every joint shall be flat wrapped with approved material.

3104 CONSTRUCTION. All mortar shall be used within 40 minutes after mixing. Mortar which has begun to take on initial set shall be discarded and shall not be mixed with additional cement or new mortar.

Manhole inverts shall be constructed of concrete conforming to the requirements of Section 2000 *Concrete*, with the exception that the concrete shall have a minimum 28-day compressive strength of 3000 psi.

In no case shall the invert section through a manhole be greater than that of the outgoing pipe. The shape of the invert shall conform exactly to the lower half of the pipe it connects. Side branches shall be connected with as large of a radius of curve as practicable. All inverts shall be troweled to a smooth clean surface.

Circular precast sections shall be provided with a mastic gasket or preformed flexible joint to seal joints between sections. The space between connecting pipes and the wall of precast sections shall be completely filled with non-shrinking mortar.

All manholes under construction shall be covered in an appropriate manner to prevent the entry of any stormwater runoff, trench water, sand, earth or any other foreign substances at any time during construction or while the manhole is unattended.

3105 DAMPPROOFING. Surfaces to receive paint shall be dry. Before backfilling is started, the exterior surfaces of precast and poured-in-place manholes shall be painted with two (2) heavy coats of coal tar paint. Application shall be in accordance with the manufacturer's specifications and instructions.

3106 CASTINGS. Manhole rings and covers shall be Clay and Bailey No. 2008 BV, Deeter No. 1315, GCI castings SM2202, or approved equal. The exception shall be for use on shallow

manholes where manhole covers shall be Clay & Bailey No. 2020, Deeter No. 2016, GCI castings SM 2100, or approved equal.

When bolt-down type manhole rings and covers are required and specified, Clay and Bailey No. 2014 M, GCI Casting SB 2200STD, or approved equal, with rubber gaskets and stainless steel cover bolts 5/8-inch diameter with hexagonal-head bolts shall be furnished. Bolt-down type manhole rings shall be anchored to the manhole with not less than four 3/4-inch diameter anchor bolts having a minimum of 14 inches (14") of embedment, except in concrete manholes in which the ring is embedded in concrete.

If castings arrive on the job without a foundry coating, one coat of coal tar paint shall be applied. Before painting, all castings shall be thoroughly cleaned and properly supported. All loose rust shall be removed by wire brushing. Castings shall not be handled until the paint is dry and hard. All castings shall be interchangeable with the Clay and Bailey model numbers.

Prior to backfilling, casting and adjusting rings shall be flat wrapped with approved material.

3107 STUBLINES. Stublines for future sewer main connections shall be provided in manholes at the locations indicated on the drawings and shall terminate in a bell and plug.

3108 CONNECTIONS TO EXISTING MANHOLES. All sewers constructed of rigid pipe extending from manholes shall be encased with concrete to the first pipe joint from the manhole. A rubber gasket water stop shall be required for all rigid and flexible pipe connections.

3109 PLASTIC MANHOLE STEPS. Polypropylene coated steel reinforced steps "plastic steps" shall be M.A. Industries, Inc., model PS-2-PF, American Step Company, Inc., model ML-13 or approved equal manhole step for precast concrete manholes.

3110 GRADE RINGS. All manholes shall be fitted with an adjusting ring or rings providing a minimum adjustment of four inch (4") and a maximum adjustment of twelve inches (12") and one adaptor ring between the cone section and the casting in conformance with Detail 31-6.

3111 ACCEPTANCE TESTING Vacuum tests shall be conducted on all newly constructed manholes and existing manholes that have been repaired or restored or manholes constructed over existing sewers.

All lift holes shall be plugged with a non-shrinking mortar, as approved by the engineer. The contractor shall plug all pipes connected to the manhole using pneumatic plugs. The pneumatic plugs should be placed into the pipe after the inside surface has been cleaned. Air shall be introduced into the plugs to 25 psig. Bracing can be used to ensure that the plugs are not pulled into the manhole during vacuum testing. After the manhole has been properly prepared, the vacuum tester shall be installed. The test head shall be placed on top of the casting or fit inside the casting in a manner which incorporates the casting and all adjusting and adaptor rings into the vacuum test. The vacuum pump shall be connected to the outlet port with the valve open. The outlet valve shall be closed after a vacuum draw of 10 inches of Hg. has been obtained. The test shall pass if the vacuum remains at 10 inches Hg. or drops to 9 inches Hg. in a time greater than one minute. If the manhole fails, the contractor shall locate the leak and make proper repairs and then re-test.

The manhole vacuum tester shall be as manufactured by P.A. Glazier, Inc., or approved equal. The pneumatic plugs, a part of Cherne Air-Loc Equipment as manufactured by Cherne Industrial of Hopkins, MN., or approved equal. These plugs shall have a sealing strength equal to or greater than the diameter of the connecting pipe to be sealed. A visual inspection will be performed for each manhole by the engineer after the manhole has met the requirements of the vacuum test and is considered in its final state. The inspection shall determine the completeness of the manhole. Any defects identified shall be repaired to the engineer's satisfaction.